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Deep Learning Based Tracking Reconstruction and Magnetic Field Measurement Research in the Muon g-2 Experiment

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The Run1 result of the Fermilab muon g-2 experiment have shown a 4.2 standard deviation between the experimental measurement and theoretical prediction of a_μ , strongly indicating a new physics signal.

The experiment already accumulated 21x data compared to the BNL experiment. The J-PARC muon g-2 experiment will collect $\sim 3.5x$ statistics compared to Fermilab. It can be expected that, with the increases of the collected data volume, and limited by the speed and accuracy, the existing tracking reconstruction and magnetic field measurement method may not fully satisfy the requirement of the experiment.

The breakthrough of the deep learning inspires new analysis method in the muon g-2 experiment. In this poster, we will present some preliminary research of the tracking reconstruction based on RNN and the magnetic field measurement based on PINN (physics informed neural network). The preliminary result shows that the deep learning method has enormous potential in these topics.

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Session Classification: Poster session and buffet dinner

Track Classification: Precision measurements